XVIII. *Some Experiments upon the* Ochra friabilis nigro fuſca *of* Da Coſta, *Hiſt. Foſſ. p.* 102.; *and called by the Miners of* Derbyſhire, Black Wadd. *By* Joſiah Wedgwood, *F. R. S.*

Read March 13, 1783.

THE extraordinary circumſtance of this ſubſtance taking fire upon being ſlightly mixed with linſeed oil, firſt diſcovered by accident in the year 1752, at Mr. BASSANO's, a painter in Derby, has rendered it a ſubject of curioſity; but, as it is now employed in conſiderable quantities, and very advantageouſly, as an oil-colour in ſhip and houſe-painting, it has a better claim to our attention; and it is hoped, an attempt towards the further inveſtigation of ſo curious and uſeful an earth may be acceptable to this illuſtrious Society.

It is many years ſince I firſt collected ſome of this earth, which baſſetted out in a hollow way near Winſter, in Derbyſhire, and tried ſome experiments upon it; but as they were not very intereſting to me at that time, and my hands being full of other matters, I made no further uſe of it till December laſt, when a ſeries of experiments being made at the Preſident's houſe upon its inflammable property when mixed with oil, at which JOHN WALSH, Eſq. and ſeveral other gentlemen were preſent, Mr. WALSH was kind enough to ſend me a ſpecimen from thence, and expreſs his deſire that I would analyſe, and make ſome further experiments upon, this extraordinary ſubſtance.

Mr. WOODWARD, as well as Mr. DA COSTA, has deſcribed this earth ſo minutely, that it cannot eaſily be miſtaken; but from the following experiments it will appear, that it ſhould not be claſſed amongſt the *Ochres not acted upon by acids*; and that it may, with as great propriety, be called *Manganeſe* as *Ochre*.

EXP. 1. Mixed with porcelain biſcuit body, it gives darker or lighter ſhades of black and brown, as the quantity is greater or leſs in proportion to the body.

EXP. 2. Mixed with linſeed oil, in the quantity of a few penny-weights only, into a paſte, it dried very ſlowly, without producing any perceptible ſmoke or heat. The quantity, perhaps, was too ſmall for ignition, and, I believe, it was over-doſed with oil.

EXP. 3. When the mineral was previouſly calcined with a ſlight red heat about half an hour, the mixture of it with the oil dried much ſooner and harder; a circumſtance which, if not already known, may render it ſtill more valuable to the painter. In other reſpects no difference could be obſerved.

EXP. 4. In the above low heat it ſuffers no alteration of colour or texture. In a heat of 30°, by my thermometer for meaſuring high degrees of heat, it loſes its property of ſtaining the hands, diminiſhes very conſiderably in bulk, acquires a little hardneſs, though it ſtill proves friable between the fingers, and has its colour changed from a browniſh to a blueiſh black. In a heat of 80° it begins to melt; and at 95° runs into a black ſcoria.

EXP. 5. With black flux, in a heat of 90°, by the abovementioned thermometer, it yielded a button of lead, amounting, in one experiment, to 21; and in another to 22 grains from an ounce, or nearly $\frac{1}{22}$.

EXP.

EXP. 6. Water extracts nothing from it. The mineral acids, with the aſſiſtance of heat, diſſolve about eleven parts out of twelve; but a large quantity of acid is neceſſary for this ſolution. The reſiduum is greyiſh white, full of bright micaceous particles, with a few fine filaments like thoſe of aſbeſtos, which ſuffer no change in a moderate red heat. In a heat of 144°, which is 14° beyond the fuſion of caſt iron, it ran into a perfect glaſs; but whether this was a vitrification of the pure earth itſelf, or of a combination of it with the argillaceous matter it was in contact with, the ſmallneſs of the quantity did not admit of aſcertaining. Upon the Heſſian crucible it formed a black glaſs; what adhered to the thermometer-piece was brown.

EXP. 7. On boiling with oil of vitriol to dryneſs, the bottom and ſides of the maſs became red like colcothar, the middle white, the intermediate parts yellow or reddiſh yellow, and ſome greeniſh. Theſe appearances were at firſt attributed to a vitriol of iron in different degrees of calcination; but, on ſeparating ſome of the purer white and red parts, the former were found to produce in vitrification the ſame colour as manganeſe does, the latter the ſame as colcothar; the other ſeemed to be a mixture of the two.

EXP. 8. A ſolution of the mineral in nitrous acid was precipitated, inſtead of common alkali, with Pruſſian lixivium, which has the property of throwing down from acids iron, manganeſe, and all metallic bodies, but no one of the earthy claſs. When the addition of this lixivium ceaſed to make any further precipitation, common alkali, added afterwards, had alſo no effect; a proof that this mineral contains no earth ſoluble in acids, for that would have remained in the liquor after the

the precipitation of the other matters by the Pruſſian lixivium, and been precipitated by the alkali added at laſt.

EXP. 9. On precipitating a like ſolution by gradual additions of alkaline lixivium, and ſeparating the precipitates as often as a freſh addition of the alkali occaſioned any different appearance from what the preceding had done; the firſt precipitate was white; the next of a ruſty red colour, like precipitate of iron; the laſt very white, while diffuſed through the liquor, and when ſettled, but in drying turned a little brown. The firſt, which was in a very ſmall quantity, as nearly as could be judged by weighing the filters, about a twentieth part of the other two, was found to be lead; the ſecond was iron; and the third manganeſe, nearly in equal quantities, all pure, or very nearly ſo, from one another.

It appears from theſe experiments, that 22 parts of this mineral contain nearly two of indiſſoluble earth, chiefly micaceous, 1 of lead, about 9½ of iron, and the ſame quantity of manganeſe.

Specimens of the colours produced by vitrification.

O. The mineral itſelf.
1. 2. 3. The firſt, ſecond, and third precipitates.

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